

Natural Configuration Tables

This section provides general information on the Natural configuration tables which are contained in the NATCONFIG module.

The following topics are covered:

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- Code Page Support
- Output Devices Supported
- Specification of NTDVCE
- Translation Tables
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Related topic:

- Input/Output Devices Supported
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NATCONFIG Module

The NATCONFIG module contains the Natural configuration tables.



In general, the default specifications in NATCONFIG need not and should not be modified.

In particular, **do not modify** without prior consultation of Software AG support any of the tables marked with an asterisk (*) in the list below.

For most of the tables, there are corresponding macros in the Natural parameter module NATPARAM as well as dynamic profile parameters. If you need to modify a NATCONFIG table, use the corresponding parameter-module macro, or dynamic profile parameter, to overwrite the table. (If you made the modifications in the NATCONFIG tables themselves, you would have to modify and reassemble NATCONFIG again with subsequent system maintenance (SM) releases.)

The NATCONFIG module uses macros for the definition of the following Natural default configuration tables.

In addition, it uses the following tables:

- The default attention identifier table. It defines the physical terminal keys to Natural (*).
- Various other tables (*).

General Overview of Macros Used by NATCONFIG

The following table provides a general overview of the macros used by the NATCONFIG module for the definition of the Natural default configuration tables:

Macro	Purpose
NTDVCE	Table of terminal types. Used to specify the terminal driver to be used, see description below, for details. (* Do not modify an existing NTDVCE macro, rather create a new one).
NTSTAT	List of Natural objects that are linked to the Natural nucleus. Any additional object to be linked to the nucleus must be specified with an NTSTAT macro. When searching for an object, Natural always scans this list first, regardless of the library specified. For information on how to link Natural objects to the Natural nucleus, see the ULDOBJ function in Linking Natural Objects to the Natural Nucleus.
NTTAB	Primary output translation table.
NTTAB1 NTTAB2	Secondary output/input translation tables.
NTUTAB1 NTUTAB2	Tables for translation between lower and upper case. These tables have to be modified, for example, for the German character set.
NTTABA1 NTTABA2	Tables for translation of EBCDIC characters to ASCII characters and vice versa. These tables are used by the SYSTRANS utility.
NTTABL	SYS* translation table. Translates output from programs contained in Natural "SYS" libraries.
NLANG	Language translation table. Contains a list of all available language codes defined to Natural (*).
NTSCTAB	Scanner character type table. Determines which characters are lower-case alphabetical, upper-case alphabetical, numeric and special characters (applies to dynamic profile parameters, MASK and SCAN options).

For further details, see also Translation Tables.

NTDVCE - Terminal-Device Specification Table

For each terminal type supported by Natural, a terminal converter routine is provided. The corresponding terminal drivers are responsible for the actual terminal I/Os. They build the physical data stream from the screen buffer and the screen attribute buffer and place it in the terminal I/O buffer.

In addition, the telex driver module NATTLX is provided for Con-nect in order to provide faster telex, telefax and teletex communication from and to the TOPCALL system. NATTLX supports the TOPCALL full-page protocol.

With the NTDVCE macro, it is possible to add new terminal drivers to Natural to specify modifications of the terminal-specific input/output or lower-to-upper case translation tables. Other information which can be specified is the frame character, the position of the message line, whether screen optimization is to be on or off, as well as various flags in the IOCB. In addition, the terminal specification can be routed to an existing driver by using other translate tables or can hook into a driver routine.

The NTDVCE macro is invoked by either the terminal command %T from the Natural command line or the SET CONTROL statement from within a Natural program. At the start of a Natural session, the translation tables NNTTAB, NNTTAB1, NNTTAB2, NTUTAB1 and NTUTAB2 are copied from the NATCONFIG module into the user area where they are modified by NTDVCE.

Note that the translation tables can be modified by the same macros dynamically or within the NATPARM parameter module.

Code Page Support

By using the NTDVCE macro, different code pages can be defined and associated with a specific terminal type and name. If Natural is then started with PM=C, all terminal I/O is translated on input and retranslated on output. Thus, as long as the code pages are compatible, a common data representation can still be maintained.

Output Devices Supported

Control variables and formats define attributes to generate a certain representation on the output device. Natural offers a wide range of possible attributes to allow the end user the best use in designing maps and reports on the terminal.

Unfortunately not all terminals support all features available with Natural. These features are mostly ignored on such devices or are simulated via other techniques. Basically there are two data stream definitions in an IBM environment called standard data stream and extended data stream and a multitude of data stream definitions in an SNI environment.

The following output devices are supported:

- Sequential Output Devices for Batch, Additional Reports
- Line-Oriented Online Terminals
- Block-Mode-Oriented Online Terminals

Sequential Output Devices for Batch, Additional Reports

The output data contain standard ASA control characters controlling the line advance and page-eject facility of the given printer. This printer can be either the central printer in the computer center supported by the online or batch spooling system or the SCS printer used as online terminal printers.

The following devices can be used to print reports generated in this form:

Impact printer	Standard central printer hardware
Laser printer	High-speed printer, terminal printer
Daisy printer	Terminal printer
Inkjet	Terminal printer

Line-Oriented Online Terminals

TTY	Data sent to TTY devices are generated using the standard formfeed, linefeed, etc. characters.
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Block-Mode-Oriented Online Terminals

IBM	All models and sizes which support standard data stream and/or extended data stream.
SNI	All 9750 and compatible monochrome devices and all 9763 and compatible color devices.
Wang	All models.
PC	All models and sizes which support standard data stream and/or extended data stream.

Specification of NTDVCE

For information on how the NTDVCE macro is specified and for descriptions of the individual parameters, refer to the NTDVCE macro itself.

Example of NTDVCE Macro:

```
NTDVCE TYP=EBS2 , NAME=BS2CHAR , ENTRY=VC3270 , WXTRN=OFF , RTAL=5 ,
      FLAG1=CM3270 , TCIO=( X' C0 ' , X' FB ' , X' 6A ' , X' 4F ' , X' D0 ' , X' FD ' ,
      X' 4A ' , X' BB ' , X' E0 ' , X' BC ' , X' 5A ' , X' BD ' , X' A1 ' , X' FF ' , X' 4F ' ,
      X' 5A ' )
```

This sample macro converts internal SNI code pages to external IBM code pages. This enables you to develop applications on IBM terminals, which internally work with SNI code pages to, for example, avoid data collision when migrating from IBM to SNI.

Translation Tables

All data printed, displayed or written by Natural programs are translated by Natural. This guarantees that no illegal control characters can cause terminal I/O errors or display garbage information on the terminal. Another feature is the translation to and from character sets different from the Latin definition, especially Arabic, Cyrillic, Greek and Hebrew characters. This section describes all features and functions concerning field translations when data are written to external devices such as CRT (screen terminals) or online and batch spooling systems.

The statements INPUT, DISPLAY, PRINT and WRITE write data to or read data from external devices such as CRT, TTY or sequential files. All these statements use parameters such as constants, variables, edit masks, control variables and formats to control the output image and the input representation. Constants and variables are generated by using their respective values in the output image. The representation of these values is then controlled by the control variables, formats, edit masks and translation tables.

Natural uses several translation tables and also provides the use of alternative translation tables, all included in NATCONFIG.

The following tables are provided:

Macro	Table
NTSCTAB	The SCAN/MASK character table which defines the properties of each printable character for the Natural mask definition function. This table can be used to define upper-case attributes, lower-case attributes, special characters, hexadecimal characters and numeric characters. It can be modified by the user and the result can be used directly in the Natural MASK clause. To modify this table, you can use the macro NTSCTAB Macro in the Natural parameter module or the corresponding dynamic profile parameter SCTAB.
NTTAB	The standard (primary) output translation table used for screen or printer output. Basically this table is used to translate all characters below X'40', that is from the space character to the question mark (X'00' is not translated). This guarantees that all terminal-control characters are translated before output and no control escape sequences can influence the screen output. Special characters (X'FE' and X'FF') which could influence the screen output are translated into question marks. If nothing else is specified, all Natural output data are translated with NTTAB. To modify this table, you can use the macro NTTAB in the Natural parameter module or the corresponding dynamic profile parameter TAB.

Macro	Table
NTTAB1	The alternative (secondary) output translation table for the secondary character set used when the Natural parameter PM is set to "C". The important aspect is the translation of all possible terminal-control characters. If PM=C is specified, all Natural output data are translated with NNTAB1. A possible application of NNTAB1 is to avoid the translation of escape sequences for printer control. To modify this table, you can use the macro NNTAB1 in the Natural parameter module or the corresponding dynamic profile parameter TAB1.
NTTAB2	The secondary input translation table used when the Natural parameter PM is set to "C". If PM=C is specified, all Natural input data are translated with NNTAB2. Conversion between different languages or code pages can be performed with this table together with NNTAB1. To modify this table, you can use the macro NNTAB2 in the Natural parameter module or the corresponding dynamic profile parameter TAB2.
NTTABS	This table defines all valid characters that can be used in Natural variable names; it is used for the Natural syntax processor. It also defines all valid characters that can be used in the first position of a Natural variable name. In addition, it defines whether the variable is a global variable, a non-database variable or a source-code variable.
NTUTAB1	The sample user-specific translation table for input translation from lower to upper case. In addition, this table performs the translation specified with the statement EXAMINE TRANSLATE INTO UPPER CASE. To modify this table, you can use the macro NTUTAB1 in the Natural parameter module or the corresponding dynamic profile parameter UTAB1.
NTUTAB2	The sample user-specific translation table which performs the translation specified with the statement EXAMINE TRANSLATE INTO LOWER CASE. To modify this table, you can use the macro NTUTAB2 in the Natural parameter module or the corresponding dynamic profile parameter UTAB2.
NLANG	The language-code table, which defines which language number is assigned to which language code in the system variable *LANGUAGE.
NTTABL	The SYS* output translation table, which is controlled by the Natural profile parameter TS. With TS=ON, this table is used to translate output produced by programs located in Natural SYS* libraries (except modifiable fields) from Latin lower case to upper case. This table allows the use of all upper- and lower-case characters in Latin oriented countries, but still allows the use of these applications in countries where the lower-case characters have been replaced with a native alphabet. To modify this table, you can use the macro NNTABL in the Natural parameter module or the corresponding dynamic profile parameter TABL.
WRDFCUC1 WRDFCUC2 WRDFCSP2	The DBCS translation tables used to translate double-byte characters into Latin characters and vice versa. These tables have to be activated explicitly, for example, for Far East countries.

Upper-/Lower-Case Translation

For modifiable and input fields, upper- and lower-case translation can be specified. In general, lower-case translation means that data are taken as they come in; no translation is performed. This even makes it possible in batch mode, for instance, to read in hexadecimal data without translation.

There are several ways of specifying upper-/lower-case translation:

LC=OFF	Lower-case translation is switched off, which means that global upper-case translation is in effect. This profile parameter can be specified in the Natural parameter module or as dynamic parameter. (The session parameter LC has a completely different function.)
%U	Upper-case translation is globally on. On the field level, the attribute AD=T or AD=W can be specified. These attributes only take effect when the global upper-case translation is deactivated (LC=ON, %L). Then it is possible to control the translation on a field level from within a Natural program.
EXAMINE TRANSLATE	Upper-/lower-case translation can also be performed with the EXAMINE TRANSLATE statement. By default, EXAMINE TRANSLATE translates to upper case via NTUTAB1 and to lower case via NTUTAB2.

CMULT Macro

It is no longer recommended to use the CMULT macro; use the EXAMINE TRANSLATE statement instead (see above).

Output Translation

All fields, after being formatted by possible edit masks, AL or NL values, filling characters, etc. are translated by a translation table. This ensures that no data can be sent to the front-end printing device with embedded control information which is not explicitly generated by Natural. This means that fields can be sent to a CRT device even containing hexadecimal information identical to internal attributes. These attributes are translated before an output operation and so Natural guarantees the screen layout as defined by the output statement.

There are several translation tables available. If nothing is explicitly defined, the primary translate table NTTAB is used.

If PM=C is specified, the secondary translation table NTTAB1 is used. For modifiable fields, PM=C also means that the incoming data are translated again; that is, translated for output and retranslated for input.

With this translation table logic it is possible, for example, to convert Arabic numerals to Latin numerals. Arabic numerals have a different hexadecimal representation from the normal Latin numerals on the terminal hardware. So on output, the Latin numerals can be translated into the Arabic equivalent and on input, the Arabic numerals can be retranslated into Latin.

Special considerations have to be made for the Natural system applications which use Latin lower-case and upper-case characters. Especially on terminals supporting Arabic, Greek, Cyrillic, etc., the hardware can be switched to not display lower-case Latin characters, but rather the native characters.

Unfortunately Latin lower-case characters are not very readable when displayed in, for instance, Cyrillic. So Natural can be used with the parameter TS=ON (translate system output). TS=ON translates "SYS*" libraries (not including library SYSTEM) and all Natural system commands by a third translation table called NTTABL. The default for this translation table is an upper-case translation for all lower-case Latin characters. Of course, only output data are treated this way. So this allows data entry in the native character set even in Natural editors or system applications.

However, if Natural utilities are used to display data typed in the native character set, this results in an upper-case translation even for data in, for example, Cyrillic representation. The result would again be unreadable. So all Natural system utilities can use the format PM=C for fields containing data entered in the native character set. In this case, neither the NTTABL translation table nor the secondary translation table NTTAB1 is used. The data are simply translated by the primary translate table NTTAB.

For more information on the parameters PM and TS, see PM, and TS.

Input Translation

The translation table NTUTAB1 is available to control translation from lower to upper case. This might cause problems in countries where special characters are used which are not set up with the simple logic that just one bit controls the status of this letter. This especially concerns the German umlauts or the Danish special letters. This translation can then only be achieved by customizing the NTUTAB1 table, where for each character the corresponding lower-/ upper-case character can be specified.

If upper-case translation (%U) and PM=C is specified, first upper-case translation (using NTUTAB1) and then the secondary input translation (using NTTAB2) is performed.

Code Translation of DBCS Data

So that double-byte character set (DBCS) data can be processed the CMMPP code translation program is provided to translate double-byte characters into Latin characters; for further information, see Support of Double-Byte Character Sets (DBCS).